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Visual data processing and action control using binary neural network

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Abstract

A new model of the brain-like neural network for visual data processing and action control is proposed. The neural network is built on discrete elements with binary input and output with memory cells. Optimization of the network is conducted using a natural selection process within the framework of an artificial life paradigm. The theoretical principles of the neuron and network structure construction have been tested and assured by real experiment using a computer program which models a population of virtual bacteria living and evolving in a restricted 2D area. Virtual bacteria act using binary visual information as input. Given the rules of survival and neural network mutation, new generations of bacteria form their brain using the neural networks of their successful predecessors. The proposed approach demonstrates the possibility of constructing a brain-like neural network based only on binary data processing. © 2007 IEEE.

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Keywords

Artificial brain, Artificial intelligence, Artificial life, Neural network, Visual data processing